

Castle, every like a castle in effect.

Then there is perhaps the sole picturesque feature the limestone presents, for its tendency is to wear evenly; you get long straight fells, with tops as level as the coping of a wall, & steep, unbroken sides; & when, as in Buckalea Pass above Kettlewell, you are shut-in between ^{such long} fells, it is as if you were imprisoned between colossal walls.

Kilnsey Crag, by Conistone in Wharfedale, the Scars of Giggleswick near Settle, in Ribblesdale, & Malham Cove & Gordale Scar, within Airedale, are very fine ex-amples of limestone scars; but of these it must be admitted that the great dislocation of the limestone, known as the Craven Fault, has had some share in their production. Gordale Scar & Malham Cove, indeed, present some of the finest rock scenery in England: the former has the appearance of an enormous feudal gateway; while Malham Cove presents a great section of a vast amphitheatre, some 300 feet in height, with projecting courses which may represent tiers of seats.

At the foot of the cliff is a low arch, the mouth of a cave, & from this cave issues a clear stream, the infant Aire. But this is not the original source of the river: above the Cove, on the great limestone plateau of Malham, is Malham Tarn, & from this Tarn issues a stream, which flows some half-mile above ground; then, makes its escape through fissures in the rock, eats out a way for itself through the bowels of the plateau, is increased by other underground streams & comes to light again, as we have seen, at the foot of Malham Cove.

Now we have an example of the history of cave-making. Flowing water sinks through fissures of the rock, often partly by erosion, partly by dissolution of the rock substance.

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enlarge these pinnacles, until what was a mere crack may become an enormous cavern. This is, shortly, the history of Clapham Cave, Kellin Cave, Weathered Cave, Victoria Cave, & others less well known, which rank among the 'chaws' of Craven.

The *stalactites* & *stalagmites* which frequently adorn roof & floor of these limestone caverns are formed by a process simple enough. Water exposed to the air gives off some of the carbonic acid it contains; the less carbonic acid it contains, the less calcium carbonate (limestone) can it hold in solution. Thus, in a cavern where there is any circulation of air, some carbonic acid is given off, some limestone deposited by every drop which falls from roof to floor. A mere film of limestone remains attached to the roof, such another film is laid upon the floor, by every falling drop; & in process of ages, these films lengthen, increase, take strange forms, & become the well-known *stalactites* & *stalagmites* of the limestone caves.

We have spoken of the loneliness & the remarkable verdure of the valleys of the limestone; this loneliness is commonly heightened by contrast with the bare brown moors which abut upon them. Thus, in upper Wharfedale, we have Great Wharfedale, Conistone Moor, & Grassington Moor on the east, at no great distance from the river. The colouring changes quite suddenly, marking a sharp line of demarcation between verdant & barrenness. These high moors are of millstone grit, which bears little wet heather, coarse grasses, ling, crowberry & bilberry. The flora of the sandstone is poor, with dull brown tint, with a purple glow when the heather is in bloom, distinguishes the grit-moor at a great distance.

A geological map shows many patches of millstone grit resting upon the limestone - as Wharfedale, Ingleton, Renshaw, Fountains Fell, which are all capped with grit, while they rest upon the limestone plateau. We have now to account for the presence of millstone grit on the high places, & limestone in the valleys. The fact is, that the whole country was thickly overlaid

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with millstone grit, & this millstone grit, with limestone below it to a great depth, have been removed by denudation worn away pretty by the rivers in the act of carving out their valleys.

But it is only in the Craven district that the millstone grit has been thus carried off, giving place to the softer landscape of the limestone. In the whole of western Yorkshire, with this exception, we get the scenery proper to the grit; - bold escarpments & rock masses, as at Otley Chevin, & the Cow Stalf on Rensbold's Moor; deep forges or glens, with wooded sides; the timber rather stunted, but various, oak & spruce being the most common; wide, peat-covered ^{the banks of rivers,} moors & heaths, sometimes bogs, sometimes - with huge boulders scattered over them, weather-worn, it may be, into extraordinary shapes; yielding little to the farmer, even in the lowland. You come upon miserable patches of green oats in November - such are the main features of the grit country, which is yet not without its attractions - fine air, & a delightful scene of space in the uplands.

Occupying the south-west of the country, a geological map usually shows a dark patch, covering a district some 20 miles wide by 35 long, reaching from the extreme south to about five or six miles north of Leeds & Bradford; hemmed in on the east by the narrow Permian strip we have spoken of, & on the west, by as narrow a strip of millstone grit. Here we have the series of beds known as the Coal Measures. - here, as a consequence, we have a densely populated district, containing all the great manufacturing towns of Yorkshire.

Here the sandstone is finer & the landscape tamer than where the grit is the surface rock. Brick is rarely used as a building material, public buildings & private dwellings being commonly constructed of the good building stone which the country affords - a fact that gives an air of dignity & prosperity to the manufacturing towns of the West-riding. The bare hills are scarred with many quarries; the regions of coal pits & firms

iron-works disfigures the landscape: the streams run
black, black as ink, befouled with washings of the dye-works
& other refuse: the atmosphere is dull, laden with the
smoke of many mills & many furnaces: the foliage is
green, only in the early days of the wet spring. When the
coal-field is scored by river-valleys, the unlovely accidents
attending manufacturing industries have not quite
spoiled the beauty of the country: & even had they
done so, this section of the West Riding must needs
pay a price for being on the whole one of the greatest
most thriving seats of industry in the empire.

This great coal-field reaches down into Nottingham,
but our concern is with that part of it which lies within
Yorkshire, — a strip of the 'Lower Coal Measures' upon
which stand Leeds, Bradford, Halifax, Huddersfield,
bordering the central mass of the 'Middle Coal
Measures, whereon are Wakefield, Barnsley, Sheffield,
Nottingham.

Perhaps the best-known coals of the Lower Coal Measures
in Yorkshire are, the Better Red Coal of Bradford, a
bright coal, very free from sulphur, used in
working the Low Moor Ironstone.

The latter exists in layers, never more than
two feet in thickness, far above the coal seams:
perhaps the Low Moor iron owes its celebrity for
superior brightness as much to the excellence
of the Better Red Coal as employed in smelting
it as to the qualities of the ironstone. The
Beeston Coal Bed, near Leeds, is another valuable

bed, six feet thick in some places.
Of the Middle Coal Measures, so-called as being less
deeply buried than the lower measures, perhaps
the most valuable seam is the Lithstone Coal, reaching
from the southern boundary of the County to Cawthorne
above Barnsley. This is excellent household coal
much of which is sent to London. The Middle Coal
Measures are so called, by the way, as being less deeply
buried

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Having considered the geological formation & the landscape of the West-Riding, we can only glance briefly at those of the remainder of the county.

The Permian strip is, as we have said, a long low terrace from two to five miles in width, extending from the southern boundary of the county to a few miles north of Ripon. Seams of magnesian limestone mark its junction with the millstone grit country in the west & east. It sustains no great seats of industry; Knareborough, Kettlewell, Ladcaster, Pontefract, are among its towns. When it is cut by the river valleys, as at Thrope Beck, it is picturesque & lovely; everywhere, it is well-wooded & fertile, being covered with a rich soil which appears to favour the growth of apples. The traveller who has come off the barren millstone grit is surprised to find himself, say between Knareborough & Ripon, in a region of apple orchards & cornfields that reminds him of Hereford.

The Vale of York should give us the scenery proper to the Tertiary formation; but, practically, it is an alluvial valley, overlain with recent deposits laid down by the rivers, & fertile & level as all such valleys are.

East of York, to the north of the Derwent valley, is another picturesque region with wide moorlands, lovely fens, with waterfalls. The moorlands & hills are capped by the sandstone rocks of the oolite series, which form, in fact, a table-land, cut through by the streams which fall into the East on the one hand, or the Derwent on the other, for here we have a distinct converging system, the watershed of the oolite extending west.

A third industry supported by the Lias is the jet-
 manufacture of Whitby: the jet-rock is a kind of
 the Lias some heavy jet thick, hard, black, coloured
 & bituminous. Now the jet-lies in beds, & is
 jet-at by making holes in the face of the cliff
 at the level where jet should be found, a rather
 dangerous occupation. The jet-manufacture
 is more curious & interesting than commercially
 important: it employs between one & two
 thousand persons. Jet is, like coal, a neglected
 product, possibly derived from the same
 bituminous droppings of ancient pine-woods.
 The Limestone found in the above shall
 furnish to form the industry of this district:
 they are prepared for manufacturing purposes
 by being calcined ~~for use in the~~
 the Ammonites are the characteristic fossils
 of the Lias; they are found in ~~many~~ ^{great} numbers
 of many varieties. ~~sometimes encased in jet~~
~~which they are worked up into beads or trinkets.~~
 Whitby & Scarborough have exceedingly interesting
 geological museums, exhibiting the fossils of the Lias.
 The coast of England ^{has} presents a finer coast than
 this of Yorkshire, where from Filey Brig northward
 where the cliffs present bold, perpendicular faces
 to the sea. ~~the Lias is capped by the harder white~~
 which resists the weathering ~~that~~ ^{being} would have
 worn away the softer strata. Kelleneers, 870
 feet; Rockcliff, 660. the Peak, 600, Gicthorpe
 Cliff, 500 ft. the Peak Cliff, the Castle Hill
 of Scarborough, & the cliff on which Whitby Abbey
 stands are all remarkable & picturesque.

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The flat fertile Vale of Pickering, the valley of the Don, which separates the Eastern Moors from the chalk hills owes its character to the glacial drift brought down here at a period when northern England lay under such another ice-sheet as to this day covers much of Greenland. Alluvial deposits have been spread upon the glacial clay to a great depth, gradually raising & leveling the valley, making it one of the most fertile districts of Yorkshire. To the south of the Vale we have the long line of the chalk hills stretching inland from Hamborough Head, weather worn into soft curves, with chalk hills everywhere; to the north, the moors end, here & there, in such steep cliffs as we have already seen facing the sea: ~~where the white caps to the open sea. & indeed~~ it seems pretty certain that the vale was at one time a bay, which, in glacial times, became so choked with drift that the sea was kept out, with the retreat of the ice from northerly regions.

In the south of the Vale of Pickering we
 get the Chalk, which covers, to a depth of 600
 feet, a district measuring nearly 400
 square miles. Its outer boundary reaches
 in the form of a crescent, from Harborough
 near to the Humber, a little to the west of Hull.
 Here, as in the Downs of the south, we have a gently
 undulating country, ^{almost} destitute of running
 water. The valleys & the hill-slopes supporting
 heavy corn crops, more commonly than the
 fine close turf proper to the chalk. Sometimes
 the chalk rises into bold heights, as at Willen
 Beacon, 600 feet above the sea, & Hambley Beacon
 530 feet high. Unlike the tree-capped South Downs

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the hills are almost desolate places. The few miles of chalk coast are greatly worn by the action of the waves into creeks & gullies. The few streamers of the Wolds are fed by intermittent springs, like the Levants of the South Downs: here, these are called pygmies (hardy). Thin chalk itself is the minerals proper to the chalk.

Kolderness, which lies within the chalk crescent we have spoken of, has an interesting geological history. It is covered with boulder clay, hard & dark, & full of angular fragments of rocks which are found in situ in Norway, Scotland, & northern England. Geologists are agreed that this boulder clay witnesses to the fact that northern England was, at three different periods, as completely under an ice covering as is Greenland at the present time. But the boulder clay is pretty overlain by alluvial deposits - peat, sand, &c.; & there are dunes, not to the glonding of rivers, but to the silting up of the fringe of rivers which originally bordered the coast: of these, Herness is the only one still in existence as a shallow lake. Though it is low, Kolderness is not level, except in the south, where there is much marsh land reclaimed from the Hernesses. The structural history of this district is not confined to the past: from Bridlington to Spurn Head, the land is retreating before the sea at the rate of two yards a year; that is, a strip some six feet wide is annually carried off from this coast. Towns, villages, churches, graveyard, have been carried away bit by bit; & Ravenspurn, the port-shore haven of Boilingbush, landed to claim the crown, has been lost bodily, leaving no more than a swinnies that it stood somewhere near Spurn Point. Spurn Point itself, with the ridge which connects it with the mainland, is but a sandbank; but within the Point, new lands are being laid down, formed of the material which the sea has stripped from the coast together with the mud brought down by the Hernesses. The rich mud flats thus laid down are of great interest as showing stable land in the very process of making.

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The Mountains of Yorkshire.

The mountains near north of Ribblesdale has thirty summits above 2,000 feet in height. Of them, Mickel Fell, 2,550 ft. is the highest in the County; it is not entirely a Yorkshire hill; across its summit runs the boundary line between Yorkshire & Westmoreland. To the south of Mickel Fell the land sinks into Stanmore, a broad pit-moor with rugged heights; and beyond Stanmore is the great mountain plateau of western Yorkshire rising into many ridges & fells, where the Eden, Lune, Swale, Ure, Ribbles, Wharfe & Aire all have their sources.

The first noteworthy is the triangle formed by Arkengarthdale & Swaledale - a vast traversed by many miles by rich lead veins, running east-west, where are the famous Airedale & Arkengarth lead mines - are three moorland fells exceeding 2,000 feet: Boggan Seat, Peter Crag, & Pin Seat.

Following the Swale up to its head, we come to a very dreary region - a semi-circle of moorland fells including Kinn Claverton, High Seat, Lady's Riller &c., forming the eastern wall of the gloomy pass of Malham Tarn, which has Wild Swan Fell in Westmoreland on the west.

Between Swaledale & Airedale is Battledale - traversed by the road between Threlkirk & Kinn. Pass with lovely Seat - & Churner Fell on either hand. Both uninteresting pit-fells in themselves but affording glorious views of the moorland country to the south.

Kiddal Fell, commanding Skipton & Addleborough, a noble somewhat isolated hill

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with a glorious view of Wensleydale, as the last
of the summits of the North Riding we have space
to ~~mention~~ ^{note}.

Of the more picturesque mountain region of the West
Riding it is necessary to speak more in detail.

Kensall Hills, in the extreme west-corner of the county,
partly in Westmoreland, & cut-off from the rest
of Yorkshire by the lovely Linn valley, belongs
to the slate hills of the Lake Country, & present the
billowy broken aspect - of the Cumbrian mountains
rather than the rounded or straight outline of
the limestone & gritstone fells.

Still within the ^{picturesque} ~~scenic~~ ~~valley~~ strip of the country -

those drainage fells into the Irish Sea, we have

the long straight fells which shut-in Garsdale &

Sentdale, both the valleys of feeders of the Linn.

Sentdale, one of the Beauties of Yorkshire, is a more

ravine ~~in one ravine~~ between transverse ridges

running east & west. The traveller by the Great

Midland line between Settle & Carlisle crosses

the mouth of the valley: a creek occurs in the

wild landscape of moor & mountain. ^{the gap}

discloses itself, a long valley, more beautiful

green, yet sunnier than the Val of St. John.

It is a half-way station which calls itself